

# Safety Insights from the Fukushima Daiichi Accident Applicable to DOE Nuclear Facilities



Presentation for the “DOE Nuclear Safety Workshop, Preliminary Lessons Learned From Fukushima Daiichi”

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# ISSUE:

## Safety Design and Regulation: One Facility at a Time



- ▶ NPPs: Multiple units on a site (Fukushima, 6 units)
  - Do they interact (causatively?)
  
- ▶ DOE: Several facilities on a site
  - Can they support each other?
    - shared equipment by design
    - mutual support even if not part of the design
  
  - Can they threaten one another operationally?
    - Contamination
    - access (radiation, heat, spray, fire)

# ISSUE:

## Decision process in emergencies --- authorities; “de jure” and “de facto” (rules vs. actual practice)



- ▶ COMMON MANAGEMENT

At a DOE Site: How would it work when facing multiple decisions at multiple facilities?

- ▶ ANALYSIS

to reveal VULNERABILITIES & OPPORTUNITIES

# ISSUE: The Need for a Design Basis VS. The Need to Understand What Happens Beyond it.

- ▶ Need for a clear Design Basis
- ▶ Need to understand performance beyond the Design Basis
  - Recognition of diminishing returns for BDB loads
    - In terms of confidence in the performance
    - In terms of acceptance of inadequate performance or adverse consequences
- ▶ ALL of the ABOVE RELIES on ANALYSIS
  - Sequence by sequence (scenario basis)
  - Understanding of each scenario – phenomena, which “failures” contribute
- ▶ **GRADED APPROACH**

# ISSUE: Accident Analysis



- ▶ Risk triplet
  - What can go wrong?
  - How probable?
  - What are the consequences?

## **ISSUE:**

**Need for an overall safety goal, safety objective, or safety target**



# ISSUE: Accident Management Issues



- ▶ ANALYSIS ---- think through the scenarios
- ▶ Need for some responses to be “proceduralized”
- ▶ Need to require training for some responses
- ▶ BACK Ups
  - Mutual aid (agreements) (fire fighters are the best example)
  - Mutual aid (compatibility)
- ▶ COMMUNICATIONS
  - Gear and facilities (in the face of a large natural disaster)

# ISSUE: Defense in Depth



- ▶ Prevention ---- within this: redundancy, diversity, no single-point failure
- ▶ Mitigation
- ▶ Emergency preparedness

again --- a graded approach, lots of judgment



# ISSUE: External Hazards



- ▶ The Fukushima accident put an obvious “spotlight” on how we understand these hazards and how we design against them.
- ▶ Kevin Coppersmith will talk about this set of issues next. He and I have a common perspective on how to go about understanding these hazards.